PoE Industrial Ethernet Extender

IVC-2004PT

User's Manual

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Revision

PLANET PoE Industrial Ethernet Extender User's Manual

For Model: IVC-2004PT

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1. Introduction

1.1 Checklist

Check the contents of your package for the following parts:

- PoE Industrial Ethernet Extender x 1
- User's Manual x 1
- DIN Rail Kit
- Wall Mount Kit

If any of these items are missing or damaged, please contact your dealer immediately; if possible, retain the carton including the original packing material, and use them again to repack the product in case there is a need to return it to us for repair.

1.2 Ethernet over VDSL2 Bridge Description

PLANET's state-of-the-art Ethernet-over-VDSL2 products are based on two core networking technologies: **Ethernet** and **VDSL2 (Very-high-data-rate Digital Subscriber Line 2)**. This technology offers the absolute fastest possible data transmission speeds over the existing copper telephone lines or coaxial cables without the need for rewiring.

The IVC-2004PT PoE Industrial Ethernet Extender has a switching architecture with 4 PoE of RJ-45 10/100Mbps ports and Asymmetric or Symmetric Ethernet over VDSL port (Asymmetric means upstream and downstream rate are not the same and Symmetric means upstream and downstream rate are similar) – the VDSL port can be RJ-11 or BNC Connector. The IVC-2004PT can set to **Master** or **Slave** mode via a DIP switch. When IVC-2004PT (RJ-11) is connected with another IVC-2004PT device, the performance will go up to 99/63Mbps for asymmetric data rate within 200m and go up to 28/2Mbps at 1.4km. The IVC-2004PT (BNC) performance is up to 99/65Mbps for asymmetric data rate within 200m and up to 31/4Mbps at 2.4km. This capability is ideal for use as an Ethernet extender for your existing Ethernet network.

With 4 PoE interfaces, the I**VC-2004PT** will be ideal for small businesses and workgroups requiring to deploy the PoE for the wireless access points, IP-based surveillance camera or IP phones in any places easily, efficiently and cost-effectively.

The IVC-2004PT PoE Industrial Ethernet Extender with the IP-30 aluminum metal shape is designed for easy deployment in Heavy Industrial demanding environments.

PLANET PoE Industrial Ethernet Extender provides a lower cost replacement and smooth migration for the existing **Long Reach Ethernet (LRE)** networks.

The cable specifications of the connection are listed as follows:

- 10Base-T, Category 3, 4 or 5 UTP
- 100Base-TX, Category 5, 5e or 6 UTP
- Ethernet over VDSL2, Twisted-pair Telephone Wires
- Ethernet over VDSL2, Coaxial Cable

Note	Slave device (CPE) must be connected to Master device (CO) through the telephone wire or coaxial cable. It does not allow connection like Master to Master or Slave to Slave. To check whether the IVC-2004PT is connected to Master or Slave, please refer to section 2.1.2 for more details.

1.3 Key Features

The PoE Industrial Ethernet Extender provides the following key features:

- 4-port IEEE 802.3af Power over Ethernet Standard
- Each PoE port provides 15.4 watts
- Compatible with IVC-2002, VC-201A and VC-202A (17a Profile)
- Cost-effective VDSL2 Master / Slave bridge solution via DIP Switch
- Selectable BNC and RJ-11 mode for the data transmission
- -40 to 75 degrees C operating temperature
- Redundant Power Design: 24V or 48V DC, redundant power with polarity reverse protect function
- IP30 aluminum metal case protection
- Defines Asymmetric (Band Plan 998) and Symmetric band plans for the transmission of Upstream and Downstream signals
- Complies with IEEE 802.3, IEEE 802.3u and IEEE 802.3x standards
- DMT (Discrete Multi-Tone) line coding
- Half duplex back pressure and IEEE 802.3x full duplex fause frame flow control
- Supports up to 1536 bytes packet size, 802.1Q VLAN tag transparent
- Integrated address look-up engine, supporting 2K absolute MAC addresses
- VDSL2 Stand-alone transceiver for simple bridge modem application
- Selectable Target Band Plan and Target SNR Margin
- Support extensive LED indicators for network diagnostics
- DIN Rail and Wall-mount design

1.4 Specifications

Product		IVC-2004PT
Hardware Specifications		
Ports	10/100 Base-TX	4 x RJ-45, Auto-Negotiation and Auto-MDI/MDI-X
	PoE	4 x PoE (Port1 ~ Port4)
	VDSL	1 x RJ-11, female Phone Jack 1 x BNC, female connector
DIP Switch		4 position DIP switch
Functionality *1		**Master / Slave** mode select Selectable **BNC** and **RJ-11** mode Selectable target **Band Plan** Selectable target **SNR mode**
Encoding		VDSL-DMT - ITU-T G.997.1 - ITU-T G.993.1 VDSL - ITU-T G.993.2 VDSL2 (Profile 17a Support)
LED Indicators		P1 (Green) P2 (Green) Fault (Green) Master (Green) and Slave (Green) ACT (Green) Sync. (Green) PoE (Orange)
Power Over Ethernet	PoE Standard	IEEE 802.3af Power over Ethernet / PSE
	PoE Type	End-Span
	PoE Power Input	24V or 48V DC power input source
	PoE Power Output	48V DC Per Port, 350mA . Max. 15.4 watts
	PoE Pin Assignment	1/2(+), 3/6(-)

<table>
<tr><td rowspan="3">Cabling</td><td>Ethernet</td><td colspan="2">• 10Base-T: 2-pair UTP Cat.3,4,5 up to 100m (328ft)
• 100Base-TX: 2-pair UTP Cat.5, 5e, 6 up to 100m (328ft)</td></tr>
<tr><td>VDSL (RJ-11)</td><td colspan="2">Twisted-pair telephone wires (AWG24 or better) up to 1.4km</td></tr>
<tr><td>BNC</td><td colspan="2">50 ohm: RG58A/U, RG58C/U, RG58/U and 75 ohm: RG6 (Distance 2.4km)</td></tr>
<tr><td colspan="2" rowspan="6">Performance *2
(Downstream / Upstream)</td><td colspan="2">Asymmetric Mode</td></tr>
<tr><td>VDSL (RJ-11)</td><td>BNC</td></tr>
<tr><td>200m -> 99/63Mbps
400m -> 91/48Mbps
600m -> 71/32Mbps
800m -> 53/18Mbps
1000m -> 38/8Mbps
1200m -> 33/5Mbps
1400m -> 28/2Mbps</td><td>200m -> 99/65Mbps
400m -> 99/64Mbps
600m -> 97/59Mbps
800m -> 94/51Mbps
1000m -> 84/45Mbps
1200m -> 73/37Mbps
1400m -> 61/28Mbps
1600m -> 54/20Mbps
1800m -> 48/13Mbps
2000m -> 39/9Mbps
2200m -> 35/6Mbps
2400m -> 31/4Mbps</td></tr>
<tr><td colspan="2">Symmetric Mode</td></tr>
<tr><td>VDSL (RJ-11)</td><td>BNC</td></tr>
<tr><td>200m -> 91/99Mbps
400m -> 74/79Mbps
600m -> 54/51Mbps
800m -> 38/34Mbps
1000m -> 27/21Mbps
1200m -> 24/15Mbps
1400m -> 21/10Mbps</td><td>200m -> 95/99Mbps
400m -> 92/97Mbps
600m -> 81/82Mbps
800m -> 71/70Mbps
1000m -> 60/57Mbps
1200m -> 50/44Mbps
1400m -> 42/33Mbps
1600m -> 37/27Mbps
1800m -> 29/22Mbps
2000m -> 23/21Mbps
2200m -> 19/17Mbps
2400m -> 19/13Mbps</td></tr>
</table>

Dimensions (H x W x D)	135mm x 87.8mm x 50mm
Weight	631g
Power Requirements	24V or 48V DC for PoE Devices Redundant power with polarity reverse protection function
Power Consumption / Dissipation	66.4 watts / 226BTU max. (PoE) 5.64 watts / 19.24BTU (non-PoE)
Installation	DIN Rail Kit and Wall-mount Ear
Standard Conformance	
Stability Testing	IEC60068-2-32 (Free Fall) IEC60068-2-27 (Shock) IEC60068-2-6 (Vibration)
Operating Temperature	-40 ~ 75ºC
Storage Temperature	-40 ~ 85ºC
Operating Humidity	10% to 90%, relative humidity, non-condensing
Storage Humidity	10% to 90%, relative humidity, non-condensing
Regulation Compliance	FCC Part 15 Class A, CE
Standards Compliance	IEEE 802.3 10Base-T IEEE 802.3u 100Base-TX IEEE 802.3af Power over Ethernet IEEE 802.3x Full duplex pause frame flow control ITU-T 1. G.997.1 2. G.993.1 VDSL 3. G.993.2 VDSL2 (Profile 17a)

*1. BNC and RJ-11 mode must switch to the same position for Master and Slave. Otherwise, it may cause unstability.

*2. The actual data rate will vary on the quality of the copper wire and environment factors.

2. Hardware Description

- **IVC-2004PT**

The IVC-2004PT provides 4 RJ-45 with PoE, 1 RJ-11 and 1 BNC port for network line connection. The 4 RJ-45 ports come with two different running speeds – 10Mbps and 100Mbps. It will distinguish the speed of incoming connection automatically.

This section describes the hardware features of the PoE Industrial Ethernet Extender. For easier control of the PoE Industrial Ethernet Extender, familiarize yourself with its display indicators and ports. Front panel illustrations in this chapter display the unit LED indicators. Before connecting any network device to the PoE Industrial Ethernet Extender, read this chapter carefully.

2.1 Front Panel

The unit's front panel provides a simple interface monitoring the PoE Industrial Ethernet Extender.

- **IVC-2004PT Front Panel**

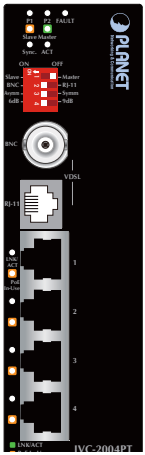


Figure 2-1: IVC-2004PT Front Panel

● 2.1.1 LED Indicators for IVC-2004PT

The diagnostic LEDs on the front panel provide the operating status of individual port.

● System

LED	Color	Function	
P1	Green	**Light**	Indicates power 1 has power.
P2	Green	**Light**	Indicates power 2 has power.
Fault	Green	**Light**	Indicates either power 1 or power 2 has no power.

● VDSL / BNC

LED	Color	Function	
ACT	Green	**Light**	Indicates that the VDSL link is established
		Blink	Indicates that the VDSL link is actively sending or receiving data over that port.
Sync	Green	**Light**	Indicates that the VDSL link is established
		Fast Blink	Indicates that the VDSL link is at training status (about 10 seconds).
		Slow Blink	Indicates that the VDSL link is at idle status.
Master	Green	**Light**	Indicates the VDSL Bridge is running at **Master** mode.
Slave	Green	**Light**	Indicates the VDSL Bridge is running at **Slave** mode.

● 10/100Base-TX with PoE Port

LED	Color	Function	
LNK/ ACT	Green	**Light**	Indicates that the port is linked up.
		Blink	Indicates that the Extender is actively sending or receiving data over that port.
		Off	Indicates that the port is **linked down**.
PoE In-Use	Orange	**Light**	Indicates the port is providing 48V DC in-line power. (1-4 ports).

● 2.1.2 DIP Switch Indication

The PoE Industrial Ethernet Extender provides 4 selective transmission modes. By switching the transmission mode, you can obtain the best transmission mode to suit the phone line or BNC quality of distance connectivity. The following is the summary table of transmission setting, bandwidth and distance extensibility tested for AWG 24 (0.5mm) twisted-pair without noise and cross talk.

DIP Switch	DIP-1	DIP-2	DIP-3	DIP-4
Function	**Mode**	**Link Type**	**Band Plan**	**SNR**
OFF	Master	RJ-11	Symm	9dB
ON (default)	**Slave**	**BNC**	**Asymm**	**6dB**

- **Master / Salve**
  - ♦ Master (Central Office) – In the Master device mode, usually the Master device will be located at the data center of ISP or enterprise to link to the backbone.
  - ♦ Slave (Customer Premises Equipment) – In the Slave device mode, usually the Slave device will be located at branch office, home or remote side as the long-reach data receiver. The Slave also can be connected to the PC, IP Camera or Wireless Access Point.

When the PoE Industrial Ethernet Extender operates at Slave mode, the DIP switch 2, 3 and 4 are non-functional.

- **Link Type**
  - ♦ BNC mode allows IVC-2004PT to connect and transfer data by using BNC cable
  - ♦ RJ-11 mode allows IVC-2004PT to connect and transfer data by using Telephone Wire

- **Band Plan**
  - ♦ User can switch the Band Plan either Symmetric or Asymmetric by their own. When Symmetric is selected, it provides better upstream performance. When Asymmetric is selected, it provides better downstream performance. Please refer to the above table for details.
- **Target SNR (Signal Noise Ratio) Margin**
  - ♦ When fixed SNR margin is selected, the system will maintain the SNR margin at 9 dB across all usable loop length.

Note	By default setting, DIP 4 switch is set at **"ON"** position and operate as **"Slave"**. To operate as **"Master"**, please set DIP 1 switch to **"OFF"** position. Adjust other DIP switch settings according to different network application demands

Please power off the PoE Industrial Ethernet Extender before making any transmission mode adjustment.

2.2 The Upper Panel

The upper panel of the PoE Industrial Ethernet Extender consists of one terminal block connector within two DC power inputs.

Figure 2-2 shows the upper panel of the PoE Industrial Ethernet Extender.

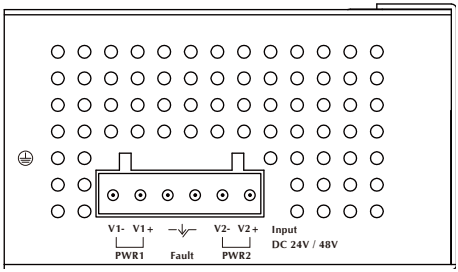


Figure 2-2 PoE Industrial Ethernet Extender Upper Panel.

3. Installation

3.1 Installing PoE Industrial Ethernet Extender – IVC-2004PT

The PoE Industrial Ethernet Extender does not require any software configuration. Users can immediately use any feature of this product simply by attaching the cables and powering on. The PoE Industrial Ethernet Extender has some limitation as mentioned below:

IVC-2004PT: The device is used for **Point-to-Point** connection only (Master device to Slave device) and has equipped with one RJ-11 and one BNC connector for VDSL2 network connection.

Telephone Wire: Depending on the quality of telephone line, the maximum distance of RJ-11 segment is 1.4km (4593ft) with AWG 24 telephone wires.

Coaxial: Depending on the quality of coaxial cable, the maximum distance of BNC segment is 2.4km (7874ft) with 5C type of coaxial cable.

The link distances and performance will vary on the quality of telephone wire and coaxial cable.

3.2 IVC-2004PT BNC / RJ-11 Proper Connection

PLANET PoE Industrial Ethernet Extender has a DIP switch which can adjust to be Master or Slave mode. As to connection of two PLANET PoE Industrial Ethernet Extenders, one must be Master (CO) mode and the other one must be Slave (CPE) mode. Please refer to the following Figure 3-1 chart.

Note

PoE Industrial Ethernet Extender does not allow connecting **BNC** and **RJ-11** at the same time.

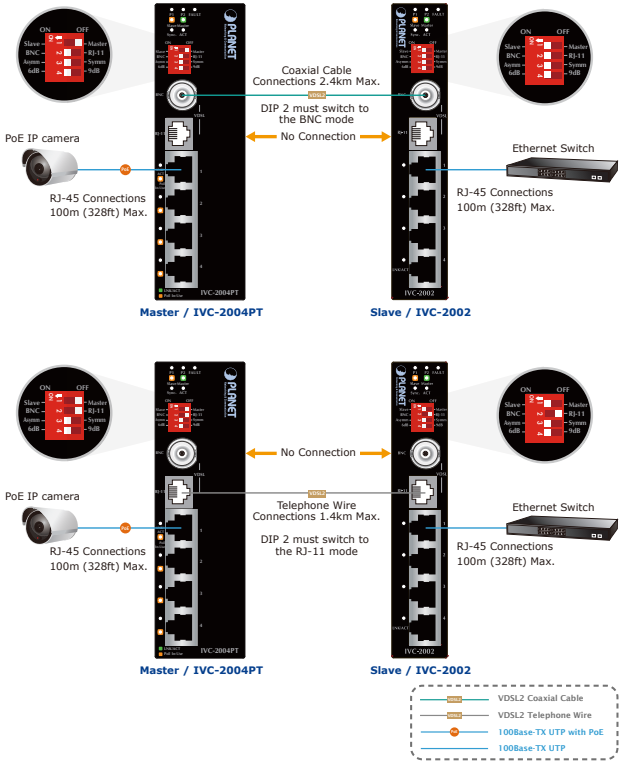


Figure 3-1: Industrial Ethernet Extender BNC and RJ-11 Connection Chart

3.3 IVC-2004PT Application Connection

Two PoE Industrial Ethernet Extenders could be used to link two different Area networks. Through the normal telephone line or coaxial cable, it could set up to 99/63Mbps (RJ-11) or 99/65Mbps (BNC) for asymmetric backbone.

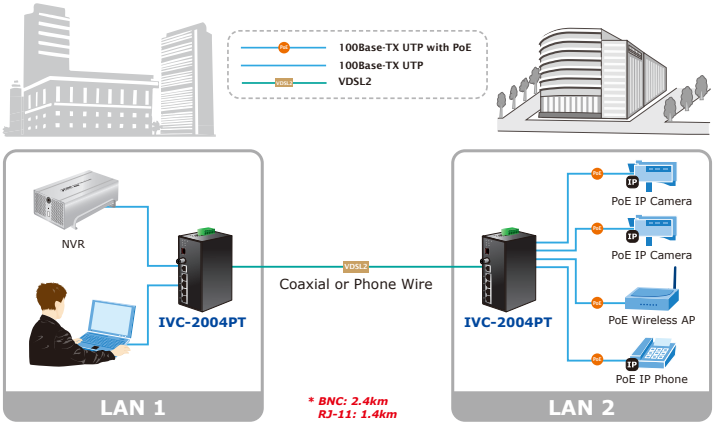


Figure 3-2: IVC-2004PT BNC and RJ-11 Connection

With 4 PoE, in-line power interfaces, the PoE Industrial Ethernet Extender can build a power central-controlled IP phone system, IP camera system, and AP group for the enterprise. For instance, 4 cameras / APs can be easily installed around the corner in the company for surveillance demands or build a wireless roaming environment in the offices. Without the power-socket limitation, it makes the installation of cameras or WLAN AP easier and more efficient

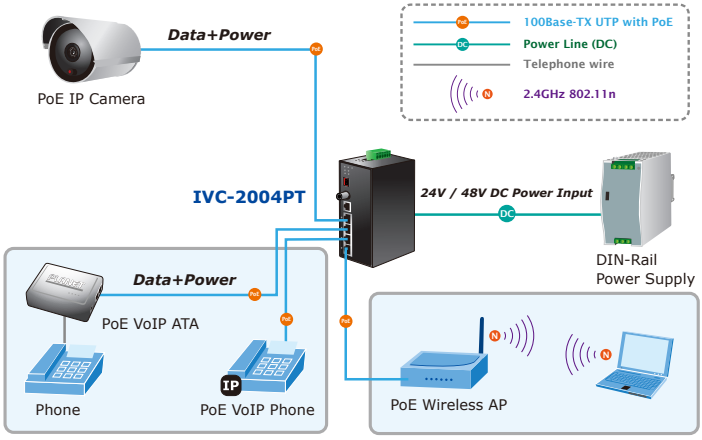


Figure 3-3: IVC-2004PT PoE Connection

The IVC-2004PT temperature range is from -40 to 75 degrees C which can handle any harsh environment and places. It is also compatible with PLANET IVC-2002, VC-201A and VC-202A, without spending extra cost to deploy a new local Internet in an apartment, hotel, campus and hospitality environment. The original network structure can be used to re-deploy with our latest PLANET IVC-2004PT. For example, MC-700, MC-1500 and MC-1500R chassis with VC-201A and VC-202A inside can be set as **CPE (Customer Premises Equipment) mode** which is placed in the wiring center (MDF room). Besides, connecting an **IVC-2004PT extender** in **Master mode** can be had by using telephone line or coaxial cable.

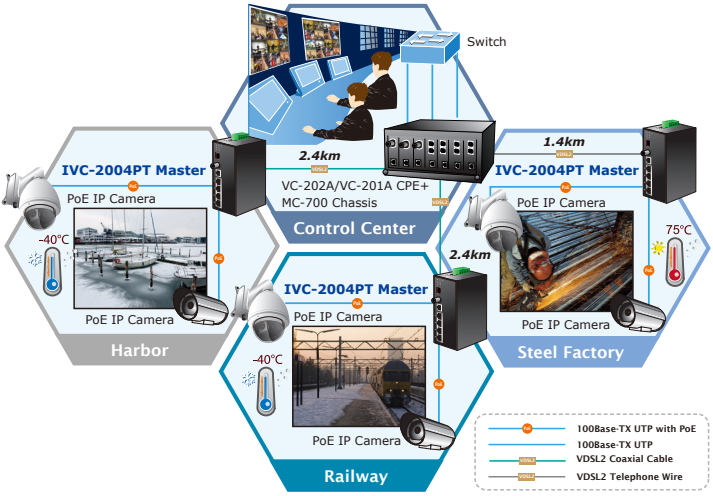


Figure 3-4: IVC-2004PT Application Topology

To decide where to put the IVC-2004PT, you must ensure:

- ♦ It is accessible and cables can be connected easily.
- ♦ Cabling is away from sources of electrical noise such as radios, transmitters and power lines and fluorescent lighting fixtures
- ♦ Water or moisture must be avoided.
- ♦ Air Flow around the unit and through the vents in the side of the case is not restricted (A minimum of 25mm inch clearance is recommended.).

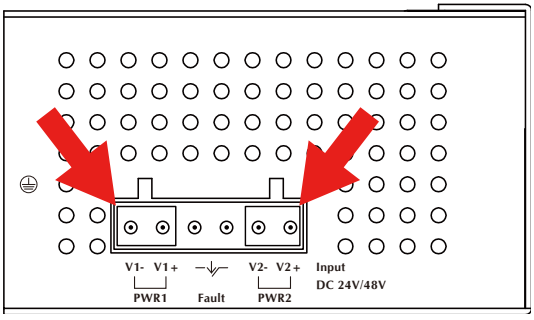
To prolong the operational life of your units:

- ♦ Do not place objects on top of any unit or stack.

3.4 Wiring the Power Inputs

The 6-contact terminal block connector on the top panel of PoE Industrial Ethernet Extender is used for two DC redundant power inputs. Please follow the steps below to insert the power wire.

1. Insert positive / negative DC power wires into contacts 1 and 2 for POWER 1, or 5 and 6 for POWER 2.

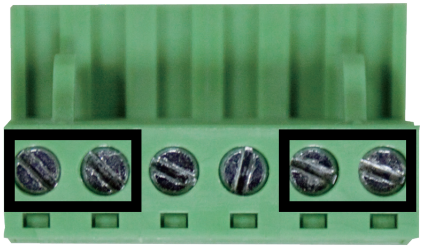


V1- V1+ V2- V2+

Note

Must input 24V or 48V DC power source to make PoE function workable.

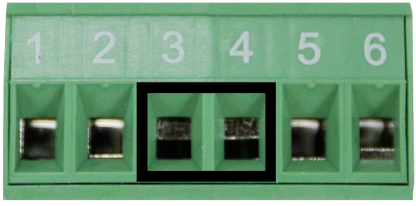
2. Tighten the wire-clamp screws for preventing the wires from loosening.



1	2	3	4	5	6
Power 1		Fault		Power 2	
-	+			-	+

3.5 Wiring the Fault Alarm Contact

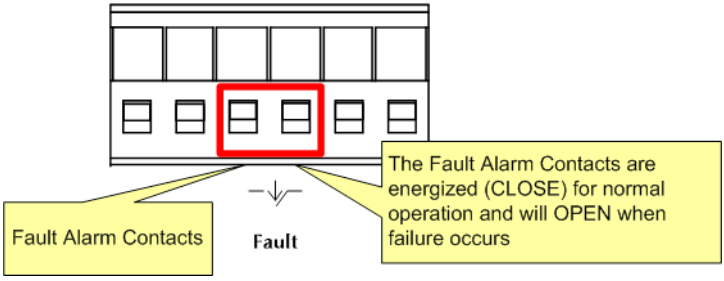
The fault alarm contacts are in the middle of the terminal block connector as the picture shows below. Inserting the wires, the PoE Industrial Ethernet Extender will detect the fault status of the power failure and then forms an open circuit. The following illustration shows an application example for wiring the fault alarm contacts.



Insert the wires into the fault alarm contacts

Note

1. The wire gauge for the terminal block should be in the range of 12 to 24 AWG.
2. Alarm relay circuit accepts up to 30V, max. 3A currents.



3.6 Mounting Installation

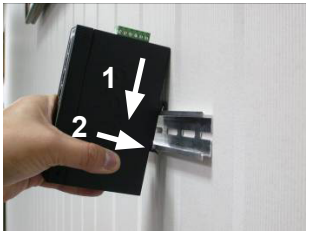
This section describes how to install the PoE Industrial Ethernet Extender and make connection to it. Please read the following topics and perform the procedures in the order being presented.

Note

In the installation steps below, this Manual uses IGS-801 (PLANET 8-port Industrial Gigabit Switch) as an example. However, the steps for PLANET Industrial Switch and Industrial Media Converter are similar.

● 3.6.1 DIN-Rail Mounting

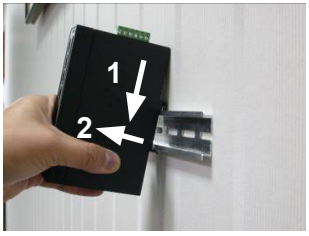
The DIN-Rail is screwed on the PoE Industrial Ethernet Extender when out of factory. Please refer to the following figures to hang the PoE Industrial Ethernet Extender on track.



Step 1: Lightly press the button of the DIN-Rail to put it onto the track.

Step 2: Check whether the DIN-Rail is tightly on the track.

Step 3: Please refer to the following procedures to remove the PoE Industrial Ethernet Extender from the track.

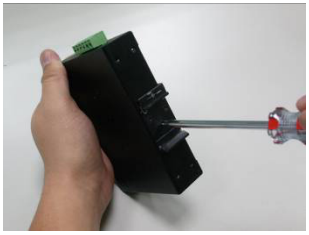


Step 4: Lightly press the button of the DIN-Rail to remove it from the track.

● 3.6.2 Wall-mount Plate Mounting

To install the PoE Industrial Ethernet Extender on the wall, please follow the instructions described below.

Step 1: Remove the DIN-Rail from the PoE Industrial Ethernet Extender; loose the screws to remove the DIN-Rail.



Step 2: Place the wall-mount plate on the rear panel of the PoE Industrial Ethernet Extender.

Step 3: Use the screws to screw the wall-mount plate on the PoE Industrial Ethernet Extender.

Step 4: Use the hook holes at the corners of the wall-mount plate to hang the PoE Industrial Ethernet Extender on the wall.

Step 5: To remove the wall-mount plate, reverse the above steps.

4. Troubleshooting

SYMPTOM:

VDSL LNK LED does not light after wire is connected to the VDSL port.

CHECKPOINT:

1. Verify the length of the wires connected between two IVC-2004PT extenders not more than 2.4km for BNC and 1.4km for RJ-11 connections. Please also try to set the DIP switch of the IVC-2004PT to the other SNR mode.

2. Please note that you must use one IVC-2004PT in Master mode and the other IVC-2004PT in Slave mode.

SYMPTOM:

TP LED does not light after cable is connected to the port.

CHECKPOINT:

1. Verify you are using the Cat.5, 5e or 6 cables with RJ-45 connector to connect to the port.

2. If your device (like LAN card) supports Auto-Negotiation, please try to modify at a fixed speed of your device manually.

3. Check whether the extender's and the connected device's power are "ON".

4. Check whether the cables are firmly seated in its connectors in the switch and in the associated device.

5. Check whether the connecting cables are good.

6. Check whether the power adapter is functional, including the connecting device.

SYMPTOM:

VDSL sometimes will re-chain and not stable.

CHECKPOINT:

1. Verify what connection type of the cable is using, BNC or RJ-11 cable.

2. Check whether the Master (CO) and Slave (CPE) DIP-2 is switched to the same and correct mode.

5. FAQ

Q1: What is the IVC-2004PT power input?

A1: 24V or 48V DC for PoE function.

Q2: What is VDSL2?

A2: VDSL2 (Very High-Bit-Rate Digital Subscriber Line 2), G.993.2 is the newest and most advanced standard of xDSL broadband wire line communications.
Designed to support the wide deployment of Triple Play services such as voice, data, high definition television (HDTV) and interactive gaming, VDSL2 enables operators and carrier to gradually, flexibly, and cost-efficiently upgrade the existing xDSL-infrastructure.

Q3: What is the best distance for IVC-2004PT?

A3: n order to guarantee the stability and better quality of network, we suggest the distance within 1.4 kilometers is the best for RJ-11 connection and 2.4 kilometers for BNC Connection.

Q4: What is the best data rate for IVC-2004PT?

A4:

Link Type & Distance / DIP Mode	RJ-11 (Telephone Wire)		BNC (Coaxial Cable)	
	200m	1400m	200m	2400m
Asymmetric	99/63Mbps	28/2Mbps	99/65Mbps	31/4Mbps
Symmetric	91/99Mbps	21/10Mbps	95/99Mbps	19/13Mbps

Q5: Is IVC-2004PT compatible with VC-201A / VC-202A?

A5: Yes, IVC-2004PT (profile 17a) and VC-201A / VC-202A (profile 17a) are based on ITU-T G.993.2 VDSL2 with the same profile; so far they are compatible with each other.

Q6: What is SNR and what's the effect?

A6: In analog and digital communications, Signal-to-Noise Ratio, often written as SNR, is a measure of signal strength relative to background noise. The ratio is usually measured in decibels (dB).

In digital communications, the SNR will probably cause a reduction in data speed because of frequent errors that require the source (transmitting) computer or terminal to resend some packets of data. SNR measures the quality of a transmission channel over a network channel. The greater the ratio, the easier it is to identify and subsequently isolate and eliminate the source of noise.

Generally speaking, the higher SNR value gets, the better the line quality, but lower performance.

Q7: What is band plan and what's the effect?

A7: VDSL2 defines multiple band plans and configuration modes (profiles) to allow asymmetric and symmetric services in the same binder (by designated frequency bands) for the transmission of upstream and downstream signals. User has the ability to select fixed band plan. The selection of Symmetric provides better downstream performance, while the selected Asymmetric offers better upstream performance.

EC Declaration of Conformity

For the following equipment:

*Type of Product: Industrial Ethernet Extender with 4-Port PoE (1 BNC / RJ-11 + 4-Port 10/100TX PoE -17a Profile, -40~75 Degree C)
*Model Number: IVC-2004PT

* Produced by:
Manufacturer's Name : **Planet Technology Corp.**
Manufacturer's Address: 10F., No.96, Minquan Rd., Xindian Dist., New Taipei City 231, Taiwan (R.O.C.)

is herewith confirmed to comply with the requirements set out in the Council Directive on the Approximation of the Laws of the Member States relating to Electromagnetic Compatibility Directive on (2004/108/EC).
For the evaluation regarding the EMC, the following standards were applied:

EN 55022		(Class A: 2006 + A1:2007)
EN 61000-3-2		(2006 + A2:2009)
EN 61000-3-3		(2008)
EN 55024		(1998 + A1: 2001 + A2:2003)
	IEC 61000-4-2	(2008)
	IEC 61000-4-3	(2008)
	IEC 61000-4-4	(2004)
	IEC 61000-4-5	(2005)
	IEC 61000-4-6	(2008)
	IEC 61000-4-8	(2009)
	IEC 61000-4-11	(2004)

Responsible for marking this declaration if the:

☒ **Manufacturer** ☐ **Authorized representative established within the EU**

Authorized representative established within the EU (if applicable):

Company Name: **Planet Technology Corp.**

Company Address: **10F., No.96, Minquan Rd., Xindian Dist., New Taipei City 231, Taiwan (R.O.C.)**

Person responsible for making this declaration

Name, Surname **Kent Kang**

Position / Title : **Product Manager**

Taiwan	22 Oct., 2010	Kent Kang
Place	*Date*	*Legal Signature*

PLANET TECHNOLOGY CORPORATION

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